DURANGO

F-85

DESKTOP DATA PROCESSING SYSTEM

Product Description

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DURANGO

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This publication describes the available or planned capabilities of the F-85 system at the time of printing. Check with your Durango representative for availability of specific features.

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Part No. 100120-001 Rev. B

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INTRODUCTION

DURANGO

The F-85 Represents A Major Advance In Integrated Design . . .

The Durango F-85 is an integrated desk-top data processing system designed for use in small businesses, professional or branch offices, and departmental environments. It is equally effective as a stand alone business system or intelligent terminal. As an integrated system, the F-85 is a cost effective, **single product solution** to a wide range of information processing and communications requirements.

The F-85 represents a major advance in contemporary, small to medium scale data processing system designs. Equipment elements including processor, video display, high speed printer, keyboard, and high capacity diskette drives are unified into a single distinctive, low-profile package not much larger than an office typewriter. This design optimizes system performance, and eliminates troublesome cables, and duplication of electronic and mechanical components found in conventional multi-box systems.

Easy to use application packages are available for a variety of small business functions from order entry and invoicing through inventory control and accounting.

Powerful and flexible system software is an integral part of the F-85. Included are sophisticated diskette file management facilities, real time executive, and one of the most advanced business oriented BASIC compiler/interpreters available. The system software efficiently utilizes the F-85 hardware elements and provides all necessary tools for the development of applications packages.

Expansion flexibility is built into the F-85 design. Multi-workstation capability, communications, and extended on-line data storage options may be added as applications grow or change.

Overall, the F-85 offers the following significant benefits:

- **Total Problem Solution;** a complete single product turnkey system from a single source.
- **System Portability;** easily installed, moved, and demonstrated. Set it on a desk or typing stand and plug it in.
- **Easy to Learn and Use;** operator prompting, familiar keyboard layout, and application program control of equipment make the F-85 quickly productive.
- **Price/Performance Improvement;** totally integrated design provides low system cost.
- **Reliability/Efficiency Improvement;** 30-40% fewer parts with typically 50% less energy consumption.
- **Expandability;** options provide performance enhancements and application flexibility.

Key Equipment features include:

- **High Capacity Diskette Drives;** nearly 1 million bytes of on-line integral storage.
- **Superior print quality;** 9 x 9 dot matrix 165 CPS printer optimized for maximum total throughput.
- **Self-checking operation;** built in diagnostics test the F-85 under operator control.

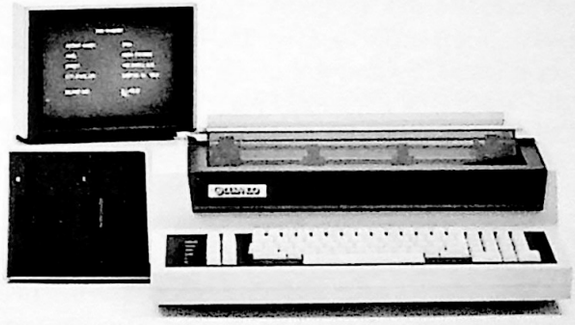
- **Multi-tasking capability;** up to four additional work stations may be added, providing concurrent operation of independent programs.
- **Human Factors;** Video display and keyboard designed for ease of use.
- **Standby power option;** provides uninterruptible AC power source for a limited period of time to enable controlled shutdown.
- **Security Key Option;** provides system security or file protection.
- **Communications** facilities for networking operation.

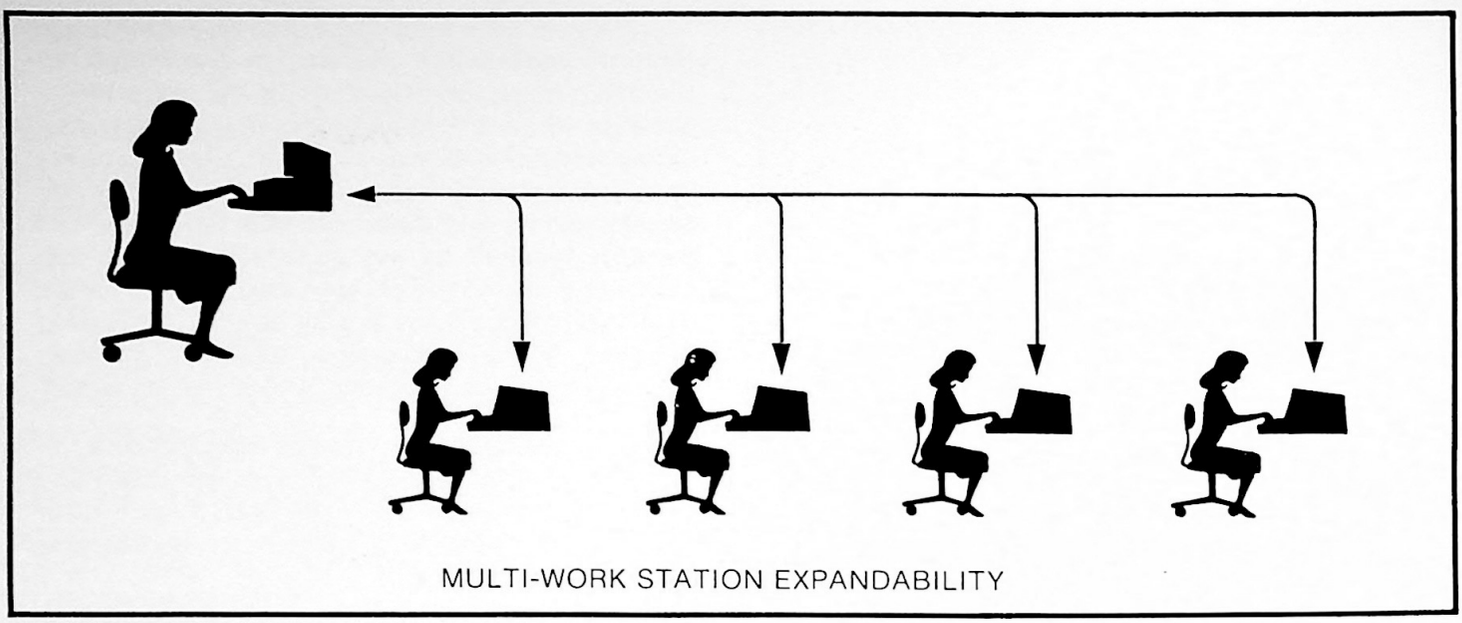
Software Features

- **Real-time Executive** provides a common base for interfacing all other software. Also available in a multi-tasking version.
- **ISAM, Random, and Sequential File Access** facilities are included for efficient data management.
- **Advanced BASIC Compiler/Interpreter** with 14 digit floating point arithmetic, string handling, arrays, and formatted I/O.
- **Ready to use Small Business Application (SBA) and Industry Specialized Application Software;** available as "building block" modules and dedicated packages.
- **Communications Packages** emulating ASCII, and 2780/3780 disciplines.

The F-85 fits a wide range of small business and terminal applications. Turnkey or pre-written application modules offer immediate installation benefits while maintaining expansion flexibility. Comprehensive General Ledger and Accounts Receivable packages are examples of F-85 modular Small Business Application programs available. The benefits realized by the installation of an F-85 containing one or two of these modules can have a dramatic affect on the productivity of a growing business. As the need occurs, additional modules such as Payroll or Inventory Control may be added.

For specialized or unique applications, D-BASIC is provided. D-BASIC is an advanced and powerful business oriented BASIC compiler which can be used for a multitude of applications.

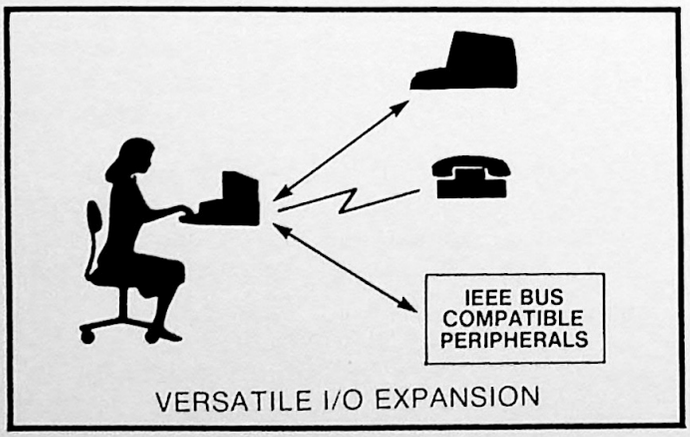




MULTI-WORK STATION EXPANDABILITY

In the concurrent operation mode up to four remote terminal work stations may be added (along with associated options) to provide multiple program execution. Examples of concurrent operation are multi-station order inquiry and inventory control applications or printing month end reports while processing orders.

As an intelligent terminal, the F-85 provides data communication and networking operation. Communications software packages emulating popular asynchronous ASCII and synchronous 2780/3780 disciplines are offered. These packages allow full networking capabilities with unattended operation. The expandability of the F-85 as an intelligent terminal provides a unique ability to grow to accommodate changing needs, or to be custom configured to the specific requirements of each network remote location.

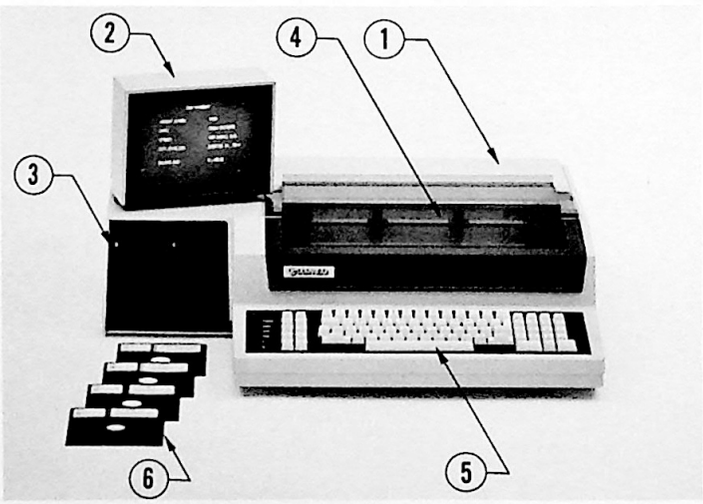


VERSATILE I/O EXPANSION

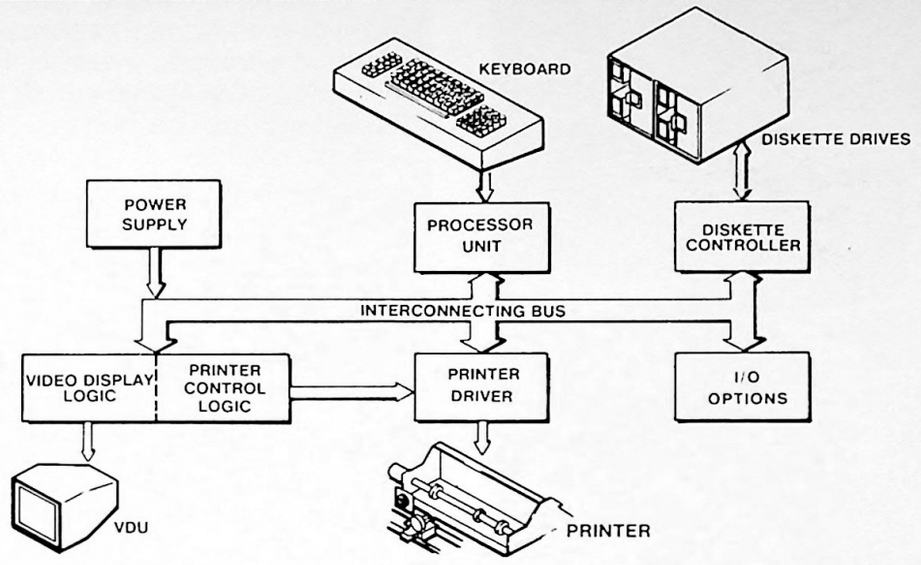
Additionally, industry standard IEEE 488-1975, synchronous, and asynchronous interfaces are available for attaching a wide variety of peripheral devices.

The F-85 is composed of six major components:

1. Processor Unit
2. Video Display
3. Mini Diskette Drive(s)
4. Serial Printer
5. Keyboard
6. Software



The following pages provide a functional description and major features summary of each of the above components.



SIMPLIFIED SYSTEM BLOCK DIAGRAM

General

The F-85 physically consists of four integral peripheral devices interconnected to a central processor unit (illustrated above). Generally, the peripheral devices may be considered input or output devices. The processor regulates all data flow and processing operations between itself and the peripheral devices. A common interconnecting bus provides all system element interface requirements, power distribution, and expansion capability to external I/O.

Processor

The Processor is of advanced design and provides high performance capability through extensive use of MOS/LSI technology. Featured are:

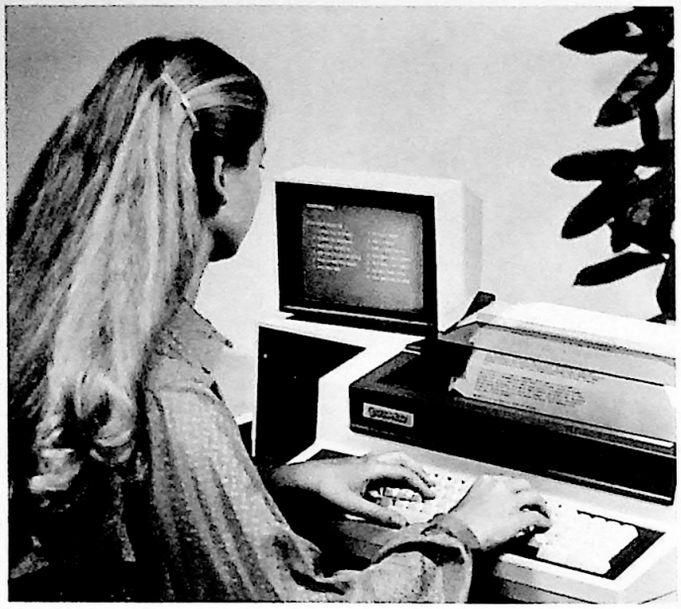
- High speed 8 bit microprocessor
- Up to 8K bytes of ROM with bootstrap and diagnostic routines
- Main memory configuration of 64K bytes
- Internal memory parity checking
- DMA facility permitting data transfers between main memory and peripherals at up to 750 Kbytes/sec
- Real-time clock
- Multi-level interrupt structure
- Power failure interrupt option

High system throughput is facilitated through the Processor's use of Direct Memory Access (DMA) circuitry in conjunction with the system bus. This arrangement permits system peripherals (i.e., diskette and video display controllers) to perform data transfers to and from main memory independent of the Processor. The multi-level interrupt structure provides efficient handling of a wide speed range of I/O devices while minimizing Processor overhead.

64K bytes of Random Access Memory (RAM) are provided. An eight bit data word format is used with a ninth bit for parity. Internal parity checks are performed during each memory read operation to insure data integrity.

Up to 8K bytes of Read Only Memory (ROM) provide system initialization, Operating System bootstrap, and diagnostic routines. The diagnostic routines are executed under operator control and establish the operational integrity of the system. The ROM overlays or "shadows" the lower region of the RAM, and is used only when the system is powered up, or the diagnostics are run. A second set of diagnostic routines provide a more comprehensive test of the system. These routines are stored on diskette and operator initiated via the keyboard.

In addition to memory parity checking, other system hardware error checks are routinely performed by the Processor. Any test errors are indicated to the operator via the display section of the keyboard, or the Video Display Unit.



Video Display Unit

The integral Video Display Unit (VDU) is used to display keyed input, provide operator guidance, and display output. As the principle operator feedback element in the system, several notable "human engineered" features are incorporated into its design:

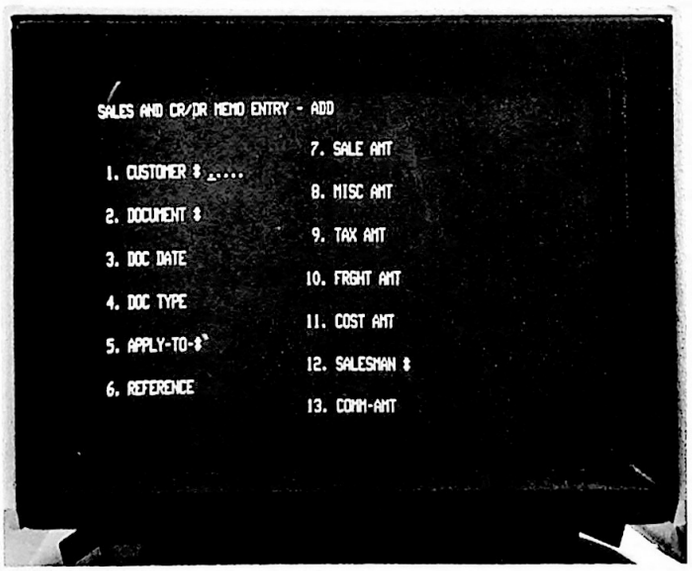
- Program controlled display formats — 24 lines of 80 characters each (1920 characters total), and 16 lines of 64 characters each (1024 characters total)
- Blink, reverse video, highlight, underscore, and graphic display capability
- 94 character ASCII display symbol set
- Foreign language character set option
- Swivel base CRT module

The dual display mode provision allows application program selection of the screen display size providing the most comfortable or appropriate display for the nature of the material being worked with. Whether the 16 line by 64 character display format (standard), or the 24 line by 80 character display (condensed font) is selected, the character size is altered to maintain best readability. The standard display employs a 7 x 9 dot character font, while the compressed display uses a 5 x 7 font. These display formats are changed under program control.

In situations where visual attention must be drawn to specific information, programmable blink, underscore, reverse video, or highlighting may be performed on any character or group of characters. These functions are implemented via special code symbols and may be embedded within program instructions.

The VDU is composed of two major components: a cathode ray tube (CRT) module, and its associated control logic. The CRT module consists of a 9 inch diagonal, low glare CRT located to the left of the keyboard. This arrangement maintains a single focal plane and minimizes eye travel between the screen and the working documents. A swivel base permits comfortable positioning to individual needs. An operator adjustable CONTRAST control is provided at the rear of the module.

The control logic is driven by the system software to provide a wide range of operational flexibility. DMA refresh from the processor main memory is employed. Foreign language character sets are optionally available through the use of a programmable character generator (ROM driven). Additionally, graphics capability is provided for the creation of straight line segment displays.



Printer

The integral Printer provides high definition matrix-type printout of reports or other program results. Designed for high throughput, reliable operation, and minimal maintenance, the Printer offers the following standard features:

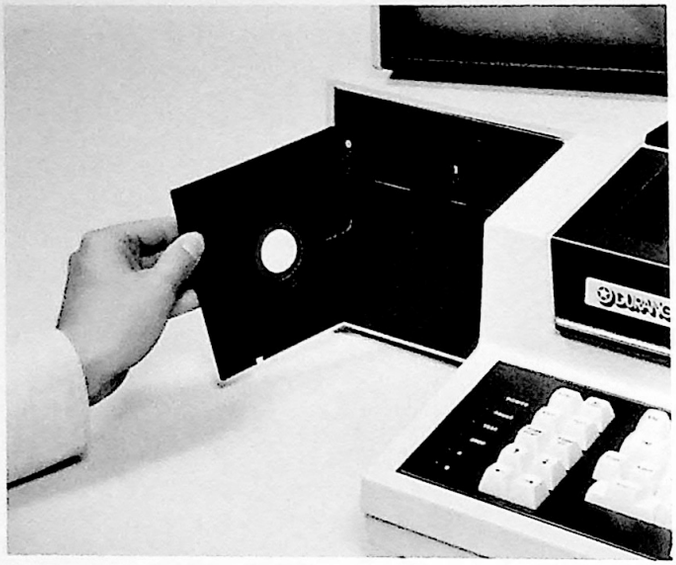
- Bi-directional printing at 165 CPS with upper/lower case capability
- High speed tabbing
- High resolution (9 x 9 dot matrix) print quality
- Integral form feed mechanism—accommodates forms from 3½" to 14⅞"
- 10 or 16.5 character per inch spacing results in 132 or 217 printable characters per line (selectable under software control)
- Accommodates 6 part forms (.020" max thickness)
- Adjustable form thickness control (manifold adjustment)
- Keyboard control of paper positioning
- Optional foreign language character sets
- Long life printhead
- Long life, low cost, easily replaced cartridge ribbon

High throughput and reliable operation are attained through the use of a microprocessor based controller. This approach also provides a substantial reduction in total parts count over conventional printer designs. "Look ahead" capability minimizes carriage movement. Bi-directional printing is also employed. A servo driven carriage assembly produces high speed tabbing with precision positioning accuracy.

From an operator standpoint, the Printer is designed for ease of use. The integral form feed mechanism aids in paper loading. Keyboard control of paper positioning further enhances ease of operation. The ribbon cartridge is drop-in replaceable and has a life expectancy of at least a month under normal usage.

The printer is capable of printing all capital letters, or of printing both UPPER and lower case letters. Its printing speed is about 165 characters per second in this demonstration, in which it is forming the characters with a 9 x 9 matrix of dots.

In addition to the standard 10 character per inch format, the F-85, under software control, prints in THIS CONDENSED FONT, which gives 217 columns in a normal 13.2 inch print line. That's enough to do a financial report showing data for 12 months, row totals and descriptions!



Diskette System

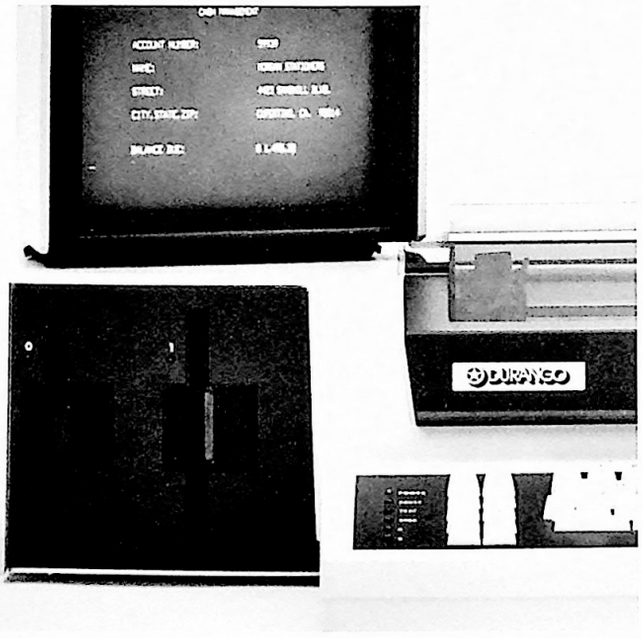
The mini-Diskette System provides reliable and inexpensive mass storage of programs and data. Up to .946 million bytes of integral storage capacity is available, with 1.89 million bytes total on-line capacity through the use of an auxiliary dual diskette drive.

The Diskette System Features:

- Small size, lightweight design
- Uses 5¼" diskettes
- Drive motor is turned off while diskette is not in use, thereby reducing power consumption and extending media life
- Write protect capability
- Expansion to auxiliary drive(s)

Using a proven high reliability encoded recording method, a single sided, single drive formatted capacity of 473K bytes is attained.

Comprehensive error detection and recovery methods assure data integrity. DMA data transfers between the controller and main memory provide high system throughput.



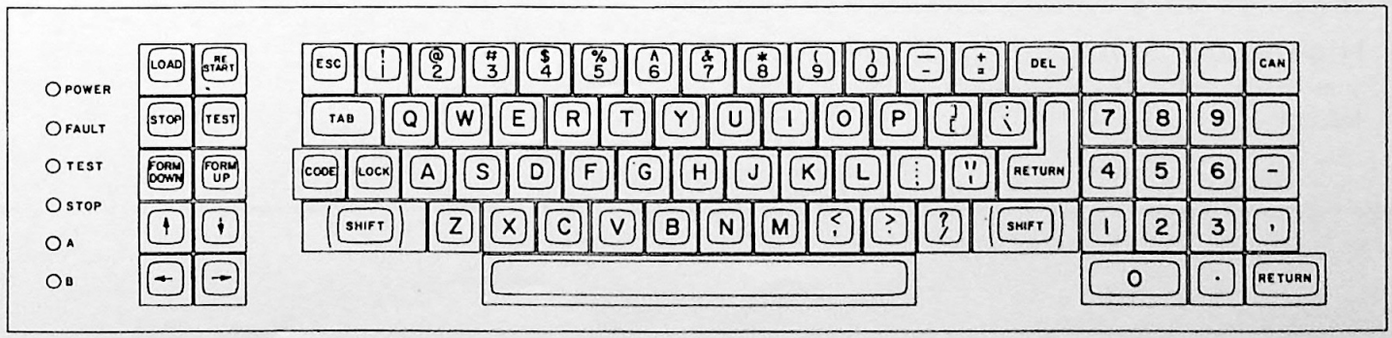
Keyboard

The Keyboard is the primary operator/programmer input element to the system. Using the familiar typewriter layout, it is designed for comfort and ease of use. Standard keyboard features include:

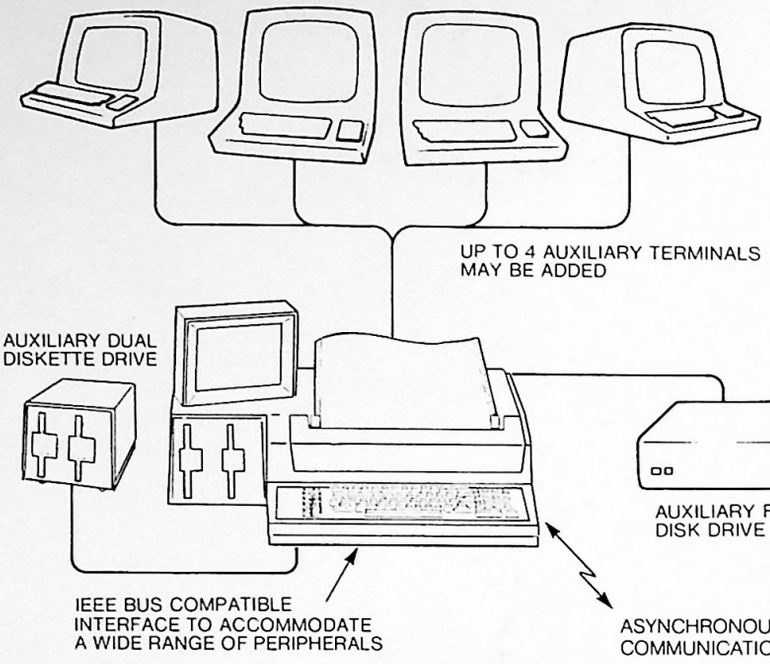
- Separate numeric pad
- Sculptured keytops (alpha-numeric section)
- Auto-repeat
- N-key rollover for maximum typing ease
- High reliability design
- Audio beep annunciation of error conditions
- Optional foreign language character sets

The Keyboard is composed of four sections: Display, Control, Alpha-numeric, and Numeric pad sections. The Display section provides LED indicators of system status. The Control section provides video display control and printer control keys.

The Auto-repeat function provides a continuous character stream at a rate of 20 CPS as long as the key is depressed. This function is activated whenever a key is depressed for more than one half-second.



KEYBOARD LAYOUT



EXPANSION OPTIONS

F-85 EXPANSION OPTIONS

The following options are available as system applications change, or as system expansion is required:

Communications

- **Multi-communications Interface** — provides up to four asynchronous serial communications ports at a data rate of up to 9600 baud. Both RS-232C and 20 mA current loop interfaces are provided.
- **IEEE 488-1975 Parallel Interface**
- **High-speed Serial Interface** (synchronous or asynchronous) with operation to 9600 baud.

Peripheral

- **Auxiliary mini-diskette drives** permitting an additional .946M bytes of on-line storage
- **Fixed disk drives** with 12M bytes storage capacity
- **Auxiliary CRT Terminals** — up to four remote work stations may be added
- **Security key** provides system disable, system unlimited access, or file protection
- **Standby power** provides controlled shutdown and protects memory contents in the event of a power failure

SOFTWARE

System Software

The F-85 employs advanced and powerful system software facilities to achieve programming flexibility, efficiency, and expandability. The primary components of the system software are:

- ☐ DX-85 Executive Operating System
- ☐ D-BASIC Compiler/Interpreter
- ☐ System Support Utilities
- ☐ Diagnostics

Together these components efficiently utilize all system hardware elements regardless of the application being executed. In addition they allow the application software to be of a modular design permitting rapid alteration or expansion of user applications.

Operating System

The Durango Executive (DX-85) operating system performs system initialization, internal "housekeeping," file management, and task monitoring. In addition, it contains the major hardware component drivers. DX-85 features:

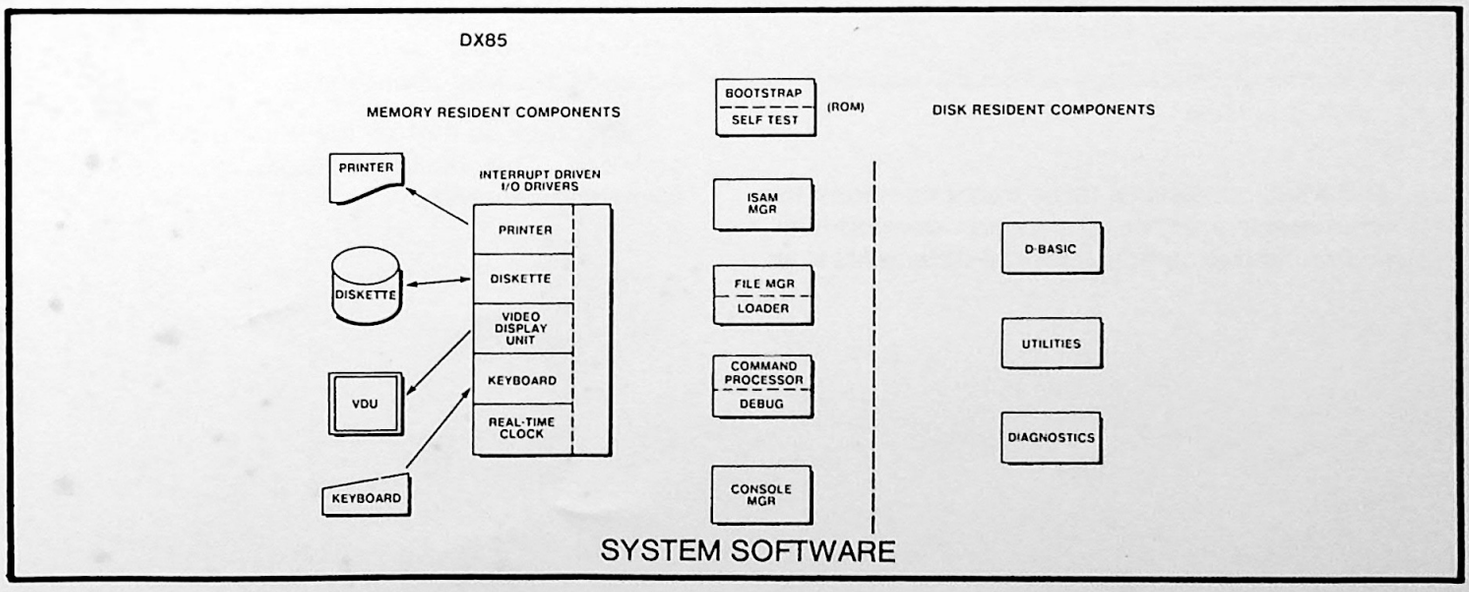
- Real-time operation
- Multi-task handling (optional)
- Random, Sequential, Sequential Access Method (ISAM) file handling
- Priority interrupt I/O handling
- I/O device control (printer, video display, keyboard, disk, and communication interface)

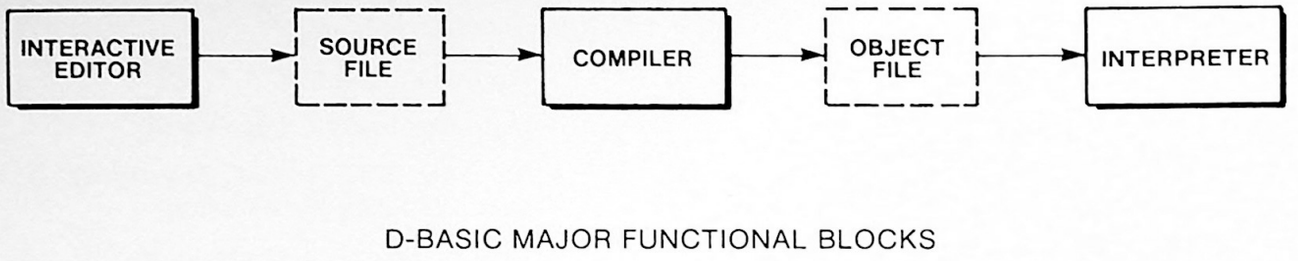
DX-85 provides a fully buffered, interrupt driven interface to the system components. It is designed to support D-BASIC file management and interface requirements.

An autostart facility is also provided. This function allows operator commands to be executed from disk. Commands may thus be chained for automatic start up of application programs.

System Support Utilities

Utilities included in the system software package perform commonly needed file and diskette maintenance tasks. File duplication, diskette duplication, and display of the diskette directory are examples.





D-BASIC MAJOR FUNCTIONAL BLOCKS

D-BASIC

For unique or highly specialized applications, it is often necessary or desirable for the user to generate custom application programs. For this requirement, the high level D-BASIC language provides a powerful tool for the efficient development of specialized programs ranging from commercial to technical applications.

D-BASIC is a powerful, business oriented, extended version of the traditional BASIC high level language. It provides sophisticated file handling capabilities and multi-user operation. D-BASIC features:

- Sequential, Random and ISAM file I/O
- External subroutine capability
- Input/Output formatting
- String and Array Processing
- Floating point decimal arithmetic with 14 digit precision

D-BASIC consists of three major components: (1) an interactive editor for program development, (2) a compiler that compiles source statements to an interpretive code and (3) an interpreter that executes the compiled code. Together these components provide a complete facility that can be used efficiently for both program development/debug, and for turnkey program execution. Programs are developed in the interactive edit/compile/run mode. After development is complete, the programs are compiled and stored on diskette in interpretive code form, thereby conserving RAM and diskette space, providing faster program execution, and protecting the source code.

The D-BASIC multi-tasking interpreter can execute multiple application programs concurrently. Up to four remote terminals are accommodated. File sharing facilities are also provided.

Fourteen digit floating point arithmetic, coupled with the formatted output capability, permits sophisticated numeric processing typically required in financial applications.

Program control of the Video Display is also provided. This facility includes complete screen formatting capability.

SOFTWARE

Application Software

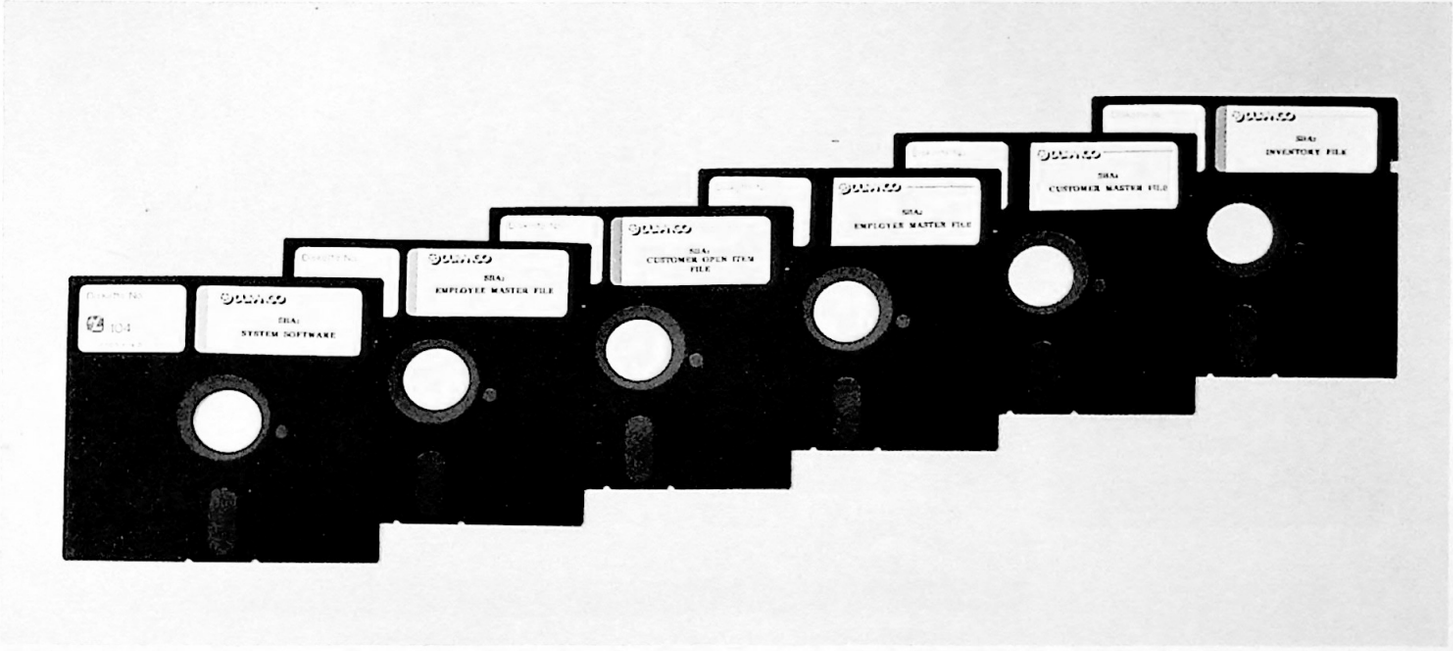
The F-85 is adapted to perform specific application functions through software. Generally, there are three approaches to application software:

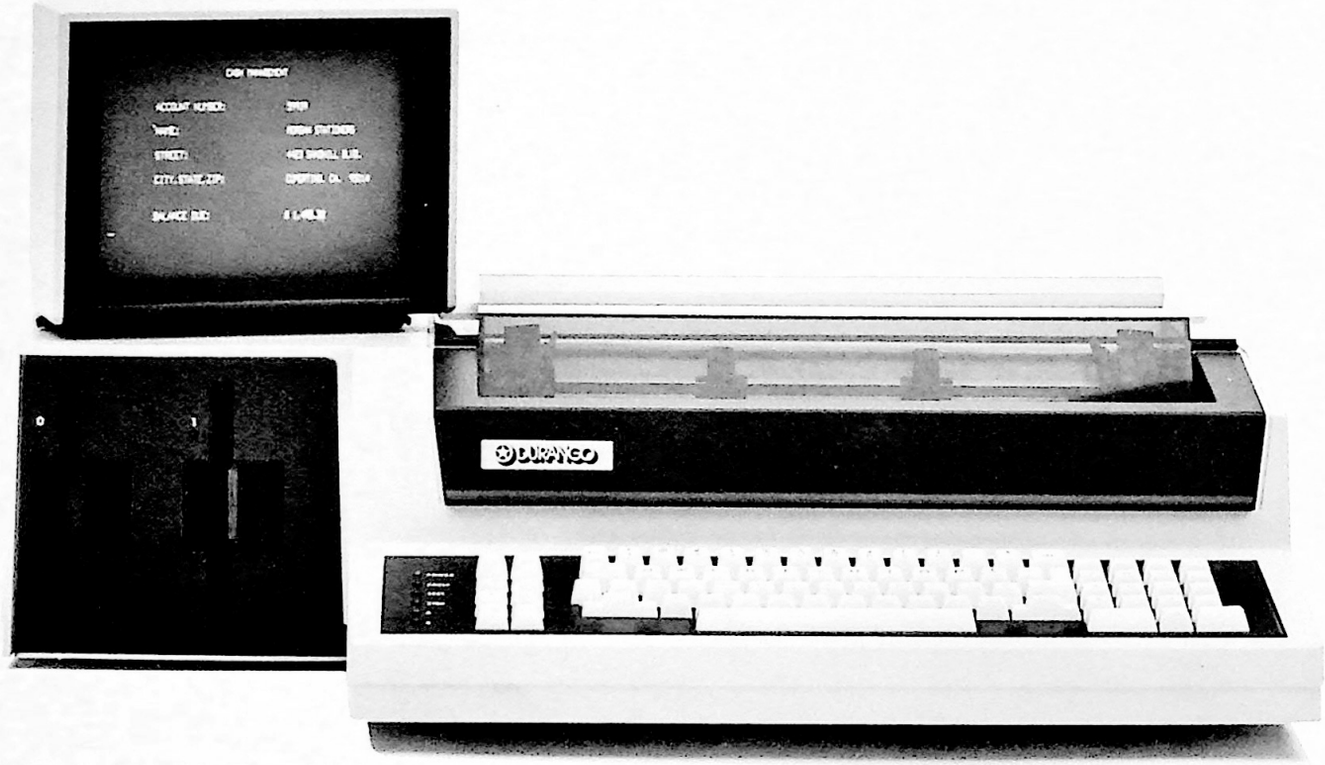
1. "Turnkey" application software
2. Standard application packages customized to fit specific applications
3. Custom application software

The Durango SBA turnkey packages are prewritten dedicated application programs, such as General Ledger or Accounts Payables for a small business. These are comprehensive, easy to use packages requiring no programming knowledge. They have provided effective solutions in hundreds of installations, and have been adapted for use with the F-85. These packages can, in many cases, be productively used without modification. In addition, they are modular and offer interface compatibility to other modules.

Frequently, only one or two of these modules justifies the installation expense of an F-85 system. Additional modules may be added as needed. Thus, the modular system design affords the small businessman the opportunity to begin with a minimum cost system and expand to suit his needs.

For additional information, refer to the Durango Application Software brochures for an overview of the available F-85 application systems.

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SPECIFICATIONS

DURANGO

EQUIPMENT

PROCESSOR

Data Path Width	8 bits
Clock Rate	3 MHz
Direct Memory Access	4 Devices
Interrupt	8-Level
Interval Timer (including real-time clock)	3 Counters (crystal time base)
Memory Addressability	65K Bytes
Device Addressability	256

MEMORY

Data Path Width	9 bits (8 Data 1 Parity)
Access Time	250 nsec
Error Checking	Parity
RAM Capacity	To 65K Bytes
ROM Capacity	To 8K Bytes

DISKETTE STORAGE

Record Format	Soft Sectored
Tracks	77 Single Sided
Capacity/Track (512 Byte Sectors)	6144 Bytes
Capacity/Diskette	473K Bytes
Diskette Size	5¼ inches
Drives per	2 Internal, 2 External
Track-to-Track Seek Time	30 ms + 10 ms settle
Latency Time	100 ms

VDU DISPLAY

Display Size	1024 and 1920 Characters
Formats	Twenty-four Lines (80 Characters) and Sixteen Lines (64 Characters); Selectable under program control
Character Set	ASCII 94 Symbol Set
Visual Attributes	Blinking, reverse video, highlight, underscore, and line graphics

EQUIPMENT

DURANGO

PRINTER

Printing Method	9 pin Serial Impact Matrix
Printing Speed	165 CPS - Bi-directional High Resolution Font
Character Set	ASCII 94 Symbol Set
Character Format	9 x 9 Dot Matrix
Character Spacing	10 or 16.5 Characters/Inch
Characters Per Line	132 or 217
Tabbing Rate	400 CPS Maximum (at 10 pitch)
Forms Handling	Continuous Forms Tractor

OPERATOR CONTROLS

Keyboard Format	Typewriter paired with 10-key pad
Key Action	N-key Rollover
Control Keys	CRT Cursor Controls Printer Controls Processor Controls
Indicators	Machine Fault, Power On, Test, Stop, General Purpose Indicators Audible Alarm

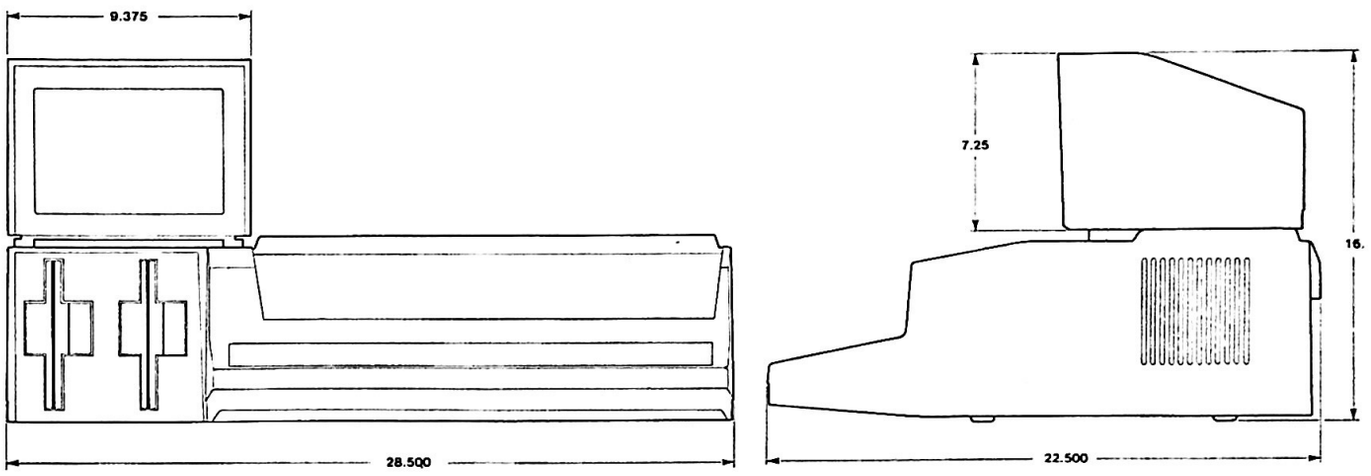
ELECTRICAL REQUIREMENTS

Power Supply	
Input Voltage Range	90-132 VAC, strappable for 186-265 VAC
Frequency	47-63 Hz
Efficiency	70%

OPTIONS

Communications	Synchronous/Asynchronous Serial Interface(RS-232C, CCITT V24)
	Four-port Asynchronous Interface(RS-232C)
	Parallel Interface (IEEE 488-1975)
Peripherals	12M Byte Fixed Disk
	Auxiliary Mini-diskette Drives
	Auxiliary VDU Terminals
	Security Key
	Standby Power

General



OVERALL DIMENSIONS

Environmental Limits	
Operating	50° to 95° F (10° to 35° C) 10 to 90% RH (noncondensing)
Storage	-40° to 150° F (-40° to 65.5° C) 10 to 90% (noncondensing)
Finish	Durable textured Durango beige and ebony brown
Weight	Approximately 56 lbs. (25.45 Kg) less VDU. VDU: 9 lbs. (4.09 Kg)

DX-85 EXECUTIVE OPERATING SYSTEM

Standard Version

Initialization	ROM bootstrap and initialization
I/O Drivers	VDU Diskette Keyboard Printer Multiple consoles Optional interfaces
Data Management facilities	Random, Sequential, and ISAM File handling facilities Directory maintenance Data Compression
Task Monitoring	Job Sequencing Error Monitoring Operator Communications Date/Time Maintenance

Multi-tasking Version *

Same as above except for the following

Users Supported	4 maximum (in addition to console)
Task Multiplexing	Interpreter Controlled
File Access Control	Record Locking File Locking

UTILITIES

BDUMP	Used to display specified blocks of binary data
COPY	Copies entire disk contents, groups, or individual files to another disk. Optionally permits file name and attribute designation changes
COPYD	Copy diskette. Produces an exact sector by sector copy of one diskette on another
EDIT	An interactive, line oriented text editor used to develop, or modify files
FDUMP	Used to display specified files contents of binary data
FILES	Lists, deletes, renames, and dates disk directory file entries. Also used to change file attribute designations, write protect status, and display disk space utilization
FORMAT	Formats a blank diskette for system use
FPRINT	Displays a specified file on the VDU or printer

* Requires Multi-user I/O board

SOFTWARE

D-BASIC

Arithmetic	14 digit floating point decimal
Arrays	Numeric and string array capability
CRT Screen Formatting	Provides complete video display screen formatting capability
File Facilities	Sequential, Random, and ISAM
Functions	Intrinsic data conversion, arithmetic, and user defined functions
Strings	Full string and substring capabilities
Report Formatting	Full print edit capability

COMMUNICATIONS PACKAGES

Asynchronous ASCII

Synchronous 2780/3780

APPLICATION SOFTWARE

Small Business Application (SBA)

- Accounts Receivable
- Accounts Payable
- General Ledger
- Invoicing/Inventory Control/Sales Analysis
- Payroll

Industry Specific Applications

NOTES

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